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The 2018-2019 Mayotte volcano-tectonic crisis: insights from electromagnetic experiments

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Since May 2018, the Mayotte Island (Comoros archipelago) is ongoing the largest basaltic eruption of the three last centuries, with up to several km³ deduced from modeling and direct seafloor observations. During this volcano tectonic crisis, we performed a land and shallow marine Magnetotelluric (MT) survey on the island the closest to the new volcano. Initially designed for shallow geothermal exploration (<2km depth), we extended the duration of the measurements to perform deep MT soundings (>10km depth) and get some insight into the geo-electric structure of the Mayotte island.

The analysis of the MT data shows a deep geo-electrical anisotropy in the W-NW E-SE direction that is coherent with the expected orientation of the oceanic ridge between the Somalian and the Lwandle plate. Additionally, the 3D inversion of the data shows that a massive conductive body is present at great depth (>15km), possibly related to the presence of partial melt. Interestingly, this conductor seems to become shallower in the direction of the new volcano.

After the survey, we installed two permanent MT stations in Petite Terre and Grande Terre islands to monitor possible time-lapse conductive anomaly related to fluid migration. We will show the results and discuss the Time Lapse MT strategy, challenges and observations.